

## REMARKS

Claims 1-20 are pending, wherein claims 1, 2, 6, 9, 12-14 and 16-18 have been amended. Reconsideration and allowance for the above-identified application are now respectfully requested.

Preliminarily, Applicant wishes to thank the Examiner for removing all previous grounds of rejection in light of the most recently filed amendment.

The Office Action objects to claim 12 on the grounds that "(PLB)" should be rewritten as "--(PLA)--". Applicant has amended claim 12 as suggested by the Examiner and therefore respectfully requests withdrawal of this objection.

The Office Action rejects claims 6 and 17 under 35 U.S.C. § 112, first paragraph, on the grounds that the specification does not provide support for "at least about 5% fiber". Without acquiescing in this rejection, but in an effort to advance prosecution, Applicant has amended claims 6 and 17 to remove the term "at least" from before "about 5 percent". Applicant therefore requests withdrawal of this rejection.

The Office Action rejects claims 1-20 under 35 U.S.C. § 103(a) as being unpatentable over Loercks et al. (US 6,062,228) in view of Figlar et al. (US 6,779,529) and Floyd et al. (US 4,411,280), also as evidenced by Yamaguchi (US 4,269,204). In response, Applicant respectfully submits that the claims as now presented recite combinations of elements that are neither taught nor suggested by the applied art.

Claim 1 as amended claims a filter element for manufacturing tobacco smoke filters comprising: a filtering material forming a filter element body having an outer surface and an interior portion (see Application, Figures 2 and 3) which substantially contains starch and/or a starch-based polymer mixture and comprises pores and/or filter channels in the interior portion of the filter element body (see Application, Figures 2 and 3) and being open in the direction of gas flow, the pores and/or filter channels having a diameter in a range of about 50  $\mu\text{m}$  to about 100  $\mu\text{m}$ , wherein the filtering material is arranged in alternately succeeding layers comprised of starch and/or a starch-based polymer mixture and activated carbon and the layers are stacked transversely with respect to the direction of gas flow.

Claim 1 was amended to merely recite that which was already inherently contained in the claim as previously presented, namely i) that the filtering material forms a filter element body having an outer surface and an interior portion and ii) that filter element includes pores and/or filter channels in the interior portion of the filter element body (*i.e.*, so that smoke passing

through the interior portion of the filter element body can pass through the claimed pores and/or channels).<sup>1</sup> This is in contrast to pores that are formed superficially in the outer surface (or "skin structure") of a filter element. Applicant submits that claim 1 as amended recites a combination of elements that are neither taught nor suggested by the applied art.

For example, in rejecting claim 1, the Office Action acknowledges that "Loercks ... does not ... teach the pores and/or filter channels having a diameter in the range of about 50 to 100 microns. Nor do Loercks and Figlar teach forming filter channels by water jets, needles or a laser beam." Office Action, p. 5. For this reason, the Office Action cites to Floyd et al. and asserts that "Floyd teaches pores with an average size of from about 50 to 150 microns (col. 3, lines 16-19)". Office Action, p. 6. However, claim 1 specifies that the pores and/or filter channels that are being claimed are located "in the *interior portion of the filter element body* and [are] open in the direction of gas flow". In contrast, the "pores" disclosed in Floyd are merely superficial pores formed in the outer surface (or "skin structure") of the cigarette filter rod:

In accordance with this invention, it has now been discovered that in a high efficiency thermoplastic polymer cigarette filter rod having a *skin structure* and characterized by interconnecting expanded cellular foam, at least some of the cells having fibrils bridging the cell walls; the *skin structure* can be rendered porous by partial or total removal or disruption of the *skin structure*. Specific means for treatment of the skin structure include skin solvent etching, skin abraiding, skin perforating and skin cutting. It should be understood that skin cutting includes total removal of the skin structure. In the case of cellulose acetate cigarette filter rods, the preferred process for treatment of the skin structure is solvent etching. The solvent may be selected from the group consisting of acetone, methylene chloride, triacetin, tetrahydrofuran, methylethyl ketone, diethyl ketone, dioxane, alkyl cellulose, low boiling organic acids, low boiling phenols and low boiling aldehydes. It should be understood that where compatible, aqueous combinations of any of the above may be employed. The preferred solvent is acetone. Preferably, the solvent is contacted with the filter rod surface by means of a spray impinged directly onto the rod. Etching of the skin by means of the spraying technique is preferred in that a completely random porosity of the filter rod skin structure can be obtained, such random porosity being difficult to produce with mechanical techniques. Spraying techniques include both aspirating and airless spraying. Skin removal techniques while obtaining desirable random surface necessitate the use of an oversized cigarette filter rod with considerable weight loss being generated by mechanically abraiding or cutting away the skin structure.

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<sup>1</sup> As claim 1 was not substantively amended, a subsequent office action that raises new grounds of rejection must be non-final.

Irrespective of the process employed, the product of the instant invention may be characterized as a cigarette filter rod having a substantially open cell thermoplastic foam characterized by the presence of at least some cells which are bridged by fibrils, said filter rod having a skin structure substantially higher in density than the central portion of said filter rod. The skin structure is water and air pervious having discontinuities such as to produce a rod having a % ventilation of at least 50% and preferably at least 80%. In the case of cellulose acetate cigarette filter rods, the average density of the rod is less than about 0.13 grams per cubic centimeter. Preferably, *the cellulose acetate rod pores are produced from solvent etching, randomly disposed within the skin structure* and most preferably the pores [in the skin structure] have an average size of from about 50 to 150 microns and an average frequency of from about 15 to 500 pores per square millimeter.

Col. 2, l. 38 – col. 3, l. 20 (emphasis added).

In view of the foregoing, it is clear that the "pores" described in Floyd et al. are merely superficial pores through the "skin structure" of the cigarette filter rod (e.g., formed by "solvent etching" the "skin structure"). They are not pores located "in the interior portion of the filter element body" as required by claim 1 as now presented. Moreover, regardless of whether or not the cigarette filter rod of Floyd et al. also includes pores or filter channels through the interior portion, the pores described as having "an average size of from about 50 to 150 microns" are only the surface pores formed in the "skin structure". That is clear from the fact that such pores are further described in Floyd et al. as having "an average frequency of from about 15 to 500 pores per square millimeter" (i.e., the pore frequency is measured in terms of surface area, not volume). Accordingly, Applicant submits that Floyd et al. neither teaches nor suggests a filter element having pores or filter channels "in the interior portion of the filter element body ... having a diameter in a range of about 50  $\mu$ m to about 100  $\mu$ m" as required by claim 1. As the combination of Loercks et al. and Figlar et al. admittedly fails to teach or suggest the claimed pores or filter channels, and because Floyd et al. fails to cure the deficiencies of Loercks et al. and Figlar et al. in this regard, Applicant submits that claim 1 is patentable over the combination of Loercks et al., Figlar et al. and Floyd et al. for this reason alone.

Moreover, claim 1 further specifies that the claimed pores or filter channels are "open in the direction of gas flow". However, because the pores described in Floyd et al. are merely formed through the "skin element" of the cigarette filter rod, there is no teaching or suggestion that such pores are "open in the direction of gas flow". In rejecting claim 1, the Office Action refers to Figure 7 of Floyd et al. as allegedly showing pores that are "substantially aligned with the direction of gas flow (Fig. 7)". Office Action, p. 6. However, Figure 7 of Floyd et al. does

not, in fact, show pores but rather "the *surface* of an *untreated* melt extruded foamed cellulose acetate filter rod". Col. 3, ll. 64-66 (emphasis added). Floyd et al. teaches various methods for forming pores through the "skin element" (*i.e.*, surface) of a cigarette filter rod, such as by solvent etching the skin element. However, Figure 7 is described as showing the "surface of an untreated melt extruded ... filter rod". Accordingly, the texture lines shown in Figure 7 are not "filter channels" as alleged in the Office Action. This is clear from the later teaching in Floyd et al. that "[t]he randomly distributed pores of FIGS. 8 and 9 of the drawings are in marked contrast to the *substantially non-porous skin* which may be seen in the *untreated cellulose acetate filter rod* of FIGS. 6 and 7." Col. 8, ll. 55-59 (emphasis added). For this additional reason, Applicant submits that claim 1 is patentable over the combination of Loercks et al., Figlar et al. and Floyd et al.

Claims 2-12 depend from claim 1 and are therefore patentable over the combination of Loercks et al., Figlar et al. and Floyd et al. and for at least those reasons given above relative to claim 1. In addition, they include additional elements that may further distinguish over the applied art. For example, claim 2 as amended further specifies that "the filter element body compris[es] continuous filter channels *in the interior portion* extending substantially in the direction of the gas flow, wherein the diameter of the filter channels lies in the range of 50  $\mu\text{m}$  to 100  $\mu\text{m}$ ." Floyd et al. only discloses pores that are etched through the outer surface (or "skin element") in the disclosed size range. Floyd et al. is silent as to the existence of "continuous filter channels in the *interior portion* extending substantially in the direction of the gas flow", much less which have a diameter "in the range of 50  $\mu\text{m}$  to 100  $\mu\text{m}$ ". The combination of Loercks et al. and Figlar et al. admittedly does not teach or suggest the claimed filter channels. For this additional reason, Applicant submits that claim 2 is further patentable over the combination of Loercks et al., Figlar et al. and Floyd et al.

Claim 6 further requires the inclusion of *natural fibers* selected from the group consisting of cellulose fibers, hemp and cotton fibers in an amount of about 5% by volume. None of the applied references discloses or suggests the inclusion of *natural fibers* in combination with starch and/or starch-based polymer mixture in a filtering material, much less cellulose fibers, hemp or cotton fibers. Whereas Figlar et al. discloses conventional filters that may include a combination of cellulose and cotton fibers, there is no suggestion in Figlar et al. regarding the desirability of combining *natural fibers with starch and/or a starch based polymer mixture*. As neither Loercks et al. nor Floyd et al. teach or suggest combining natural fibers with starch

and/or a starch based polymer mixture, there was no teaching, suggestion, motivation or other reason that would have led one of skill in the art to combine natural fibers with starch and/or a starch based polymer mixture in a filter element.

In rejecting claim 6 the Office Action alleges that "it is well known in the art that cotton fibers are commonly used as a component in cigarette filters". Office Action, p. 6. However, this begs the question as to whether it was well known to manufacture cigarette filters that include *natural fibers in combination with starch and/or starch-based polymer mixture* as required by claim 6. The Office Action fails to identify any teaching, suggestion, motivation or other reason that would have prompted one of skill in the art to modify the teachings of Loercks et al., Figlar et al. and Floyd et al. to obtain the claimed filter element of claim 6.

The Office Action further argues that "Loercks further discloses [a] composition where starch is utilized in [an] amount as low as approximately 2% to as high as 74% with respect to the amount of the polymer. Since applicants claim 'at least about 5%' then the amounts as high as 74% read on instant claims." Office Action, p. 6. This argument is without merit because the Office Action fails to draw any logical connection between the 2-74% of *starch* used in Loercks et al. with the "about 5%" of "natural fibers selected from the group consisting of cellulose fibers, hemp and cotton fibers" of claim 6. "Starch" is not any of "cellulose fibers, hemp [or] cotton fibers". For yet this additional reason, the Office Action fails to state a *prima facie* case of obviousness relative to claim 6 as previously presented.

Claim 9 further specifies that "the filter channels in the interior of the filter element body are introduced into the filtering material portions before forming the filter element". Claim 10 depends from claim 9 and further specifies that the filter channels are formed by water jets, needles or a laser beam. The combination of Loercks et al., Figlar et al. and Floyd et al. fails to teach or suggest forming filter channels in the interior of the filter element body using any of the processes recited in claim 10. In rejecting claim 10, the Office Action cites to column 2, lines 5-8 of Floyd et al. Office Action, p. 6. However, this section of Floyd et al. only refers to the formation of "air passages in the filter tip *perpendicular* to the tip axis permitting diluted air to enter the smoke mainstream.... [T]his is accomplished by the use of porous plug wrap, mechanical perforation, laser perforation and so forth." Col. 2, ll. 3-8 (emphasis added). Thus, the air passages are "perpendicular" to the direction of gas flow and are included to permit outside air to mix with the gases from the cigarette. As the claimed "filter channels" are located "in the interior of the filter element body" and are "open in the direction of gas flow" (claim 1),

Applicant submits that claims 9 and 10 are further patentable over the combination of Loercks et al., Figlar et al. and Floyd et al. for this additional reason.

Independent claim 13 alternatively claims a filter element for manufacturing tobacco smoke filters comprising: a filtering material forming a filter element body having an outer surface and an interior portion (see Application, Figures 2 and 3) which substantially contains starch and/or a starch-based polymer mixture and includes a plurality of pores and/or filter channels in the interior portion of the filter element body (see Application, Figures 2 and 3) aligned partly transversely relative to the direction of gas flow through the interior portion of the filter element body (see Application, Figures 2 and 3), wherein the filtering material is arranged in alternately succeeding layers comprised of starch and/or a starch-based polymer mixture and activated carbon and the layers are stacked transversely with respect to the direction of gas flow.

Claim 13 was amended to merely recite that which was already inherently contained in the claim as previously presented, namely i) that the filtering material forms a filter element body having an outer surface and an interior portion and ii) that filter element includes pores and/or filter channels in the interior portion of the filter element body (*i.e.*, so that smoke passing through the interior portion of the filter element body can pass through the claimed pores and/or channels).<sup>2</sup> This is in contrast to pores that are formed superficially in the outer surface (or "skin structure") of a filter element. Applicant submits that claim 13 as amended recites a combination of elements that are neither taught nor suggested in the applied art.

For example, in rejecting claim 13, the Office Action acknowledges that "Loercks ... does not ... teach the pores and/or filter channels having a diameter in the range of about 50 to 100 microns. Nor do Loercks and Figlar teach forming filter channels by water jets, needles or a laser beam." Office Action, p. 5. For this reason, the Office Action cites to Floyd et al. and asserts that "Floyd also depicts in Figures 6-11 that pores may be formed in any direction (without the use of needles or laser) and can be aligned partly transversely (Fig. 10) with respect to the direction of gas flow". Office Action, p. 6. However, claim 13 specifies that the claimed pores and/or filter channels are located "in the *interior portion of the filter element body* [and are] aligned partly transversely relative to the direction of gas flow through the *interior portion of the filter element body*". The characterization in the Office Action that "Figures 6-11 [depict]

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<sup>2</sup> As claim 13 was not substantively amended, a subsequent office action that raises new grounds of rejection must be non-final.

pores [that] may be formed in any direction" is erroneous. As clearly taught in Floyd et al., Figures 6, 7 and 10 do not show any pores and/or filter channels through the filter element body but rather the outer surface of an "untreated" and "non-porous skin" of a cigarette filter rod (*i.e.*, that has not yet been solvent etched to form pores through the "skin structure"). See col. 3, ll. 61-66; col. 8, ll. 57-59. Figures 8, 9 and 11 only show pores on the "surface" of the inventive cigarette filter rod, not through the "interior". Col. 3, l. 67 – col. 4, l. 11; col. 8, ll. 55-59; col. 9, ll. 2-8. Because the Office Action explicitly relies on Figure 10 as allegedly showing "pores ... aligned partly transversely (Fig. 10) with respect to the direction of gas flow", but because Floyd et al. clearly teaches that Figure 10 shows an "untreated" cigarette filter rod having a "non-porous skin" (col. 4, ll. 7-8; col. 9, ll. 6-8), the Office Action fails to state a *prima facie* case of obviousness relative to claim 13 as previously presented.

Claims 14-16 depend from claim 13 and are therefore patentable over the combination of Loercks et al., Figlar et al. and Lloyd et al. for at least those reasons given above relative to claim 13. In addition, they include additional elements that may further distinguish over Figlar et al. and Loercks et al. For example, claim 14 specifies that the filter element further comprises pores and/or filter channels that are generally aligned in the direction of gas flow through the interior portion of the filter element body. In other words, claim 14 requires some of the pores to be aligned in the direction of the gas flow and other of the pores to be aligned partly transversely relative to the direction of the gas flow. None of the art of record discloses any such combination of pore structures. The reliance on Figures 6-11 of Lloyd et al. as allegedly disclosing this feature is based on a mischaracterization of Lloyd et al., as shown above. For this additional reason, Applicant submits that claim 14 is further patentable over the combination of Loercks et al., Figlar et al. and Lloyd et al.

Claim 15 further specifies that "the pores and/or filter channels extend all the way through the filtering material". The reliance on Figures 6-11 of Lloyd et al. as allegedly disclosing this feature is based on a mischaracterization of Lloyd et al., as shown above. For this additional reason, Applicant submits that claim 15 is further patentable over the combination of Loercks et al., Figlar et al. and Lloyd et al.

Claim 16 further specifies that the pores and/or filter channels have a diameter in a range of about 50  $\mu\text{m}$  to about 100  $\mu\text{m}$ . As discussed above relative to claim 1, the combination of Loercks et al., Figlar et al. and Lloyd et al. fails to teach or suggest pores and/or filter channels within the specified size range of claim 16 and which are located "in the interior portion of the

filter element body" (claim 13). For this additional reason, Applicant submits that claim 16 is further patentable over the combination of Loercks et al., Figlar et al. and Lloyd et al.

Independent claim 17 alternatively claims a filter element for manufacturing tobacco smoke filters comprising: a filtering material forming a filter element body having an outer surface and an interior portion (see Application, Figures 2 and 3) which contains substantially starch and/or a starch-based polymer mixture and about 5% by volume of natural cellulose fibers, and which includes a plurality of pores and/or filter channels extending at least partially through the interior portion of the filter element body (see Application, Figures 2 and 3), wherein the filtering material is arranged in alternately succeeding layers comprised of starch and/or a starch-based polymer mixture and activated carbon and the layers are stacked transversely with respect to the direction of gas flow.

Claim 17 was amended to merely recite that which was already inherently contained in the claim as previously presented, namely i) that the filtering material forms a filter element body having an outer surface and an interior portion and ii) that filter element includes pores and/or filter channels that extent at least partially through the interior portion of the filter element body (i.e., so that smoke passing through the interior portion of the filter element body can pass through the claimed pores and/or channels).<sup>3</sup> This is in contrast to pores that are formed superficially in the outer surface (or "skin structure") of a filter element. Applicant submits that claim 17 as amended recites a combination of elements that are neither taught nor suggested in the applied art.

In rejecting claim 17, the Office Action acknowledges that "the above references do not ... teach that natural fibers are present in the amount of at least 5% by volume. However, it is well known in the art that cotton fibers are commonly used as a component in cigarette filters". Office Action, p. 6. However, this does not show whether it was well known at the time of the invention to manufacture cigarette filters that include *natural fibers in combination with starch and/or starch-based polymer mixture* in a filtering material as required by claim 17. The Office Action therefore fails to identify any teaching, suggestion, motivation or other reason that would have prompted one of skill in the art to modify the teachings of Loercks et al., Figlar et al. and Floyd et al. to obtain the claimed filter element of claim 17.

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<sup>3</sup> As claim 13 was not substantively amended, a subsequent office action that raises new grounds of rejection must be non-final.



The Office Action further argues that "Loercks further discloses composition where starch is utilized in amount as low as approximately 2% to as high as 74% with respect to the amount of the polymer. Since applicants claim 'at least about 5%' then the amounts as high as 74% read on instant claims." Office Action, p. 6. This argument is without merit because the Office Action fails to draw any logical connection between the 2-74% of *starch* used in Loercks et al. with the "about 5%" of "natural cellulose fibers" of claim 17. "Starch" is not "natural cellulose fibers". For yet this additional reason, the Office Action fails to state a *prima facie* case of obviousness relative to claim 17 as previously presented.

Claims 18-20 depend from claim 17 and are therefore patentable over Figlar et al. and Loercks et al. for at least those reasons given above relative to claim 17. In addition, they include additional elements that may further distinguish over Figlar et al. and Loercks et al. For example, claim 19 further specifies that the pores and/or filter channels have a diameter in a range of about 50  $\mu\text{m}$  to about 100  $\mu\text{m}$ . As discussed above relative to claims 1 and 16, the combination of Figlar et al., Loercks et al. and Lloyd et al. fails to teach or suggest pores and/or filter channels in the interior of the filter element body within the specified size range of claim 16.

Finally, the Office Action states that Applicant cannot rely upon the foreign filing priority papers because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. In response, Applicant has obtained and is submitting herewith an English translation of the German priority application.

In the event the Examiner finds any remaining impediment to a prompt allowance of this application that may be clarified through a telephone interview or which may be overcome by Examiner amendment, the Examiner is requested to contact the undersigned attorney.

The Commissioner is hereby authorized to charge payment of any of the following fees that may be applicable to this communication, or credit any overpayment, to **Deposit Account No. 23-3178**: (1) any filing fees required under 37 CFR § 1.16; (2) any patent application and reexamination processing fees under 37 CFR § 1.17; and/or (3) any post issuance fees under 37 CFR § 1.20. In addition, if any additional extension of time is required, which has not otherwise been requested, please consider this a petition therefore and charge any additional fees that may be required to **Deposit Account No. 23-3178**.

Dated this 18<sup>th</sup> day of February 2010.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'J.M. Gynn', written in a cursive style.

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# EXHIBIT A